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THE SENSITIZATION OF CULTURED MAMMALIAN CELLS TO X-RAYS BY N-OXYL

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The sensitization of mouse L cells to X-rays by 2, 2, 5, 5-tetramethyl-3-carboxypyrroline-1-oxyl (N-oxyl) was investigated under an extremely hypoxic condition. The new techniques were developed to retain the extremely hypoxic condition in the cell suspension by using a degassing and irradiation apparatus of stainless steel. The survival curve for hypoxic cells was purely exponential and had no pronounced shoulder. The extrapolation number and the D_0 value were 1.05 and 570 rad, respectively. The survival curve for aerobic cells had a pronounced shoulder. The extrapolation number and D_0 value of the curve for aerobic cells were 4.20 and 160 rad, respectively. Oxygen seems to have a composite radioprotective and radiosensitizing effect.

The presence of 10^{-3} M N-oxyl increased the radiosensitivity ($1/D_0$) of hypoxic cells by a factor of 1.63. The survival curve had a pronounced shoulder, showing a extrapolation number of 1.8. These results suggest that N-Oxyl and oxygen have a similar action in influencing the radiation response of mammalian cells.

The presence of 10^{-4} M cysteamine did not alter the radiation response of hypoxic cells in either the presence or absence of 10^{-3} M N-oxyl. This observation suggests that the intracellular sulphydryl compound, which acts as the radioprotector, does not influence sensitization by N-oxyl. Therefore, it may be concluded that the target of sensitization by N-oxyl was not the intracellular sulphydryl compound.